

# ANDREWSEYBOLD

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## EX PARTE NOTICE

### Electronic Filing

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street, SW, Room TW-A325  
Washington, D.C. 20554

Re: *DA-10-1877A Filed under PS Docket No. 06-229*

Dear Ms. Dortch:

Below please find my comments on DA 10-1877, *Public Safety and Homeland Security Bureau Seeks Comment on the Technical and Operational Feasibility of enabling flexible use of the 700 MHz Public Safety Narrowband allocation and guard band for broadband services*.<sup>1</sup> These comments are to be filed under PS Docket No. 06-229.

The comments I have filed below will answer all 22 questions put forth by the PSHSB in this Public Notice. I have been directly and indirectly involved with public safety communications use, systems design, and implementations since the early 1970s, and have helped develop public safety systems on the East Coast, in the Mid-West, and on the West Coast. Since the 1980s, I have published numerous articles about the issue of public safety voice and data interoperability, and have been active for the past two years commenting on the PSHSB's premise that the 10 MHz of spectrum already allocated to public safety for a nationwide fully interoperable broadband network provides public safety with enough spectrum to meet day-to-day needs and that during major emergencies public safety will be able to share broadband spectrum with the existing commercial broadband networks on a priority basis.<sup>2</sup>

In many of my previous filings I have disputed this assumption by the PSHSB and proven conclusively that 10 MHz of broadband spectrum will not be sufficient to meet public safety's requirements on a daily basis.<sup>3</sup> Most recently, I commented on the release of the FCC white paper entitled *Mobile Broadband: The benefits of Additional Spectrum*,<sup>4</sup> which pointed out the explosive growth of broadband service demand over the past two years and the predicted

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<sup>1</sup> [http://www.fcc.gov/Daily\\_Releases/Daily\\_Business/2010/db0928/DA-10-1877A1.pdf](http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0928/DA-10-1877A1.pdf)

<sup>2</sup> Andrew Seybold: <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020686907>

<sup>3</sup> Andrew Seybold: <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020512618>

<sup>4</sup> Andrew Seybold: <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020918897>

increasing demand for these services moving forward. This same type of demand for broadband services will also occur in the public safety sector, and as such, this paper reinforces my position that 10 MHz of broadband spectrum will not be sufficient for the public safety community to provide for day-to-day operational requirements.

T-Mobile, in its most recent filing,<sup>5</sup> also confirmed this by concentrating on other portions of the spectrum over which public safety could use broadband services. One of these was the proposal for sharing the existing narrowband spectrum, permitting a mixture of both broadband and narrowband services.

Now the PSHSB has asked for comments on this type of broadband sharing, which suggests to me that the PSHSB does not, in fact, believe that the currently allocated 10 MHz of broadband spectrum is sufficient to meet the day-to-day requirements of local, county, state, and federal, first responders.

In general, my comments focus on the following facts:

- 1) Neither LTE nor any broadband technology is capable of providing all of the various types of voice services required by public safety.
- 2) The 3GPP standards body, which oversees the standards for LTE, does not have any agenda item for the next three releases of LTE that would provide the types of one-to-many voice and off-network voice communications that are of vital importance to public safety.
- 3) Mixing broadband and narrowband voice in the same portion of the spectrum detracts from interoperability for either broadband data or voice services.
- 4) Mixing the two vastly different types of technology on a shared basis in the narrowband spectrum will cause interference to both narrowband and broadband services where they overlap and will, in essence, be detrimental to both types of services.
- 5) The goal of the PSHSB should be to provide public safety with a roadmap for BOTH nationwide interoperable voice and data services. To that end, the narrowband spectrum must be reserved for narrowband voice services and the broadband portion of the public safety spectrum reserved for fully interoperable broadband services.
- 6) Mixing broadband and narrowband systems on the narrowband portion of the spectrum will set public safety interoperable communications back several decades instead of providing a clear migration path for both voice and data services.

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<sup>5</sup> T-Mobile Ex Parte: <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020919856>

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- 7) Providing public safety with sufficient spectrum to enable the development of both a nationwide broadband network (which requires the full 20 MHz of spectrum) and with the ability to migrate voice systems to a common set of narrowband channels that include channels set aside for interoperability with all of the agencies that will be involved during major emergencies is the right approach to solving public safety interoperability issues and is the fiscally responsible thing to do.

Respectfully submitted,



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## Comments on DA 10-1877

Dated September 28, 2010: *Public Safety and Homeland Security Bureau Seeks Comment on the Technical and Operational Feasibility of enabling flexible use of the 700 MHz Public Safety Narrowband allocation and guard band for broadband services.*

The FCC has asked for comments on the above matter and listed 22 questions it would like to have answered by the respondents to the Public Notice. I have listed each question followed by my response to that question.

### Question 1:

1. *We seek to explore the circumstances, if any, under which allowing public safety the option of flexible use of the 700 MHz narrowband allocation and guard band for broadband services would be operationally feasible and technically compatible with existing and future public safety narrowband operations, including any impact on interoperability.*

My response to this question is that there are no circumstances I can see where it would be beneficial to any public safety agency or group of agencies to intermix broadband and narrowband services in the same segment of the 700-MHz band (the existing public safety narrowband channel allocations).

Doing so would provide a patchwork of broadband and narrowband systems across the United States and would not be in keeping with the goal as stated by the FCC's Public Safety and Homeland Security Bureau to provide public safety, for the first time in history, with spectrum that can be used to build interoperable voice and data networks.

Permitting this type of mixed-use spectrum would create more problems than it would solve. For example, where a broadband and a narrowband system overlap, there would be interference to both systems. Broadband systems based on commercial technology such as LTE require that each cell site be transmitting on a 24/7 basis while narrowband voice system transmitters are only turned on during actual use.

Next, of course, is the fact that neither the broadband systems nor the narrowband voice systems would provide for a nationwide fully interoperable voice or broadband network. The lack of nationwide spectrum for both voice and data would be an obstruction to the FCC and public safety community goal to provide for both voice and broadband interoperability on a nationwide basis.

The best-case scenario for public safety is to have sufficient spectrum for a fully interoperable nationwide broadband network (20 MHz) and to maintain the existing

narrowband spectrum for voice communications services, also on a nationwide basis. The existing narrowband allocation provides several levels of interoperability including nationwide calling, statewide communications, regional communications, and interoperability channels as well as local general use, trunking, and low-power communications channels. Using both of these portions of the spectrum for their intended purpose will provide for both broadband and narrowband interoperability.

The FCC's PSHSB would better serve the public safety community by leaving these two distinct bands in place and providing incentives for public safety agencies that have deployed narrowband voice to move to the 700-MHz narrowband channels for their local, regional, and interoperable narrowband systems. Over time, public safety devices that would be operational on both the broadband and narrowband spectrum allocations could be provided affordably. For the first time since it began making use of two-way radio systems in the 1930s, public safety would have both a common broadband system and a common narrowband voice system. Further, over time, the FCC could evaluate the return of existing public safety spectrum in the other bands where it is operating narrowband voice channels today.

There are those within the communications community who believe that over time broadband systems will be able to provide not only data services but also all of the voice services that are needed by public safety. However, during my research for this response, in talking to the 3GPP,<sup>6</sup> the standards body for the development of LTE specifications, as well as numerous equipment vendors and commercial network operators, it is clear that these types of voice capabilities are not on the 3GPP roadmap for any of the next three releases of the LTE specification. The requirement for voice one-to-many communications off-network, which is a prime requirement of public safety, has not even been discussed.

Public safety voice communications systems, unlike those provided by commercial network operators, require multiple off-network, one-to-many communications channels both for day-to-day operations and for use during major incidents including wild fires, earthquakes, hurricanes, and other natural and man-made disasters. In a previous filing,<sup>7</sup> I spelled out these requirements and have submitted them to the 3GPP, chip vendors, and infrastructure vendors.

2. *We seek comment on the potential level of interest in such flexible use within the public safety community, both in the short term and the long term.*

I cannot speak for the public safety community, however, it is my belief that public safety would be better served to be able to operate independent, narrowband voice

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<sup>6</sup> 3GPP: <http://www.3gpp.org/>

<sup>7</sup> Andrew Seybold: <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020550832>

and data networks with common back-end services provided in the network. This would enable a number of integrated voice and data sessions, which would increase public safety's capabilities when on an incident and would provide both voice and broadband services in two segmented portions of the spectrum with common back-end connectivity.

3. *As public safety agencies confront decisions on devoting future funds and resources for communications, should they be able to consider options for expanding broadband operations as an alternative to new or expanded narrowband networks?*

Public safety narrowband communications system requirements cannot be met today or in the foreseeable future by broadband systems. One of the issues when discussing voice and data is that voice requirements for public safety are significantly different from the services provided by today's commercial network operators. These differences include push-to-talk, one-to-many communications (available on some commercial networks today but NOT as mission-critical services), zoned dispatch (multiple channels dedicated to zones within a public safety agency's jurisdiction), and multiple citywide or systemwide channels.

For example, most cities divide their public safety service area into zones and each zone's dispatch station sends out calls for units within that zone. It is not unusual for a large city to have ten or more such zones. Further, there is the need for multiple citywide or area-wide channels for command officers and for times when an incident overlaps zones.

Perhaps the most misunderstood type of voice communications requirement is the need for multiple off-network voice channels. These channels are used on the scene of an incident and are designed to move the incident traffic off the dispatch channels. Each of these off-network channels needs one-to-many capability, and the number of channels used in a given incident is directly proportional to the size of the incident and the number of personnel on the scene. For example, during a house fire that is self-contained, the fire department at the scene might use one or two off-network channels in addition to its dispatch channel. The police on the scene for vehicular and crowd control might use another two channels, and EMS personnel another channel.

During a major incident such as a wildland fire, there is a need for many more channels. The fire service, for example, operates under the incident command system and as the incident grows in size, those who have responded are divided into groups, and then subdivided into sub-groups. There is a need for at least one channel for logistics, and the command officers might have several more channels for their own use. During the recent Tea Fire in Santa Barbara, California, the total channel allocations including local, state, and national forestry service units included 18 command-and-control channels

and 78 off-network channels (simplex or tactical). Law enforcement agencies were also using all of their allocated and available channels during the several week long fire.

Mixing broadband and narrowband channels on the same portion of the spectrum is not consistent with the needs of the public safety community.

4. We seek comment on these issues from the states and 700 MHz Regional Planning Committees (RPCs) that have responsibility for planning and coordination of the 700 MHz narrowband spectrum.

I have no direct involvement with the 700-MHz Regional Planning Committees (RPCs) except to cite the latest information I have obtained from the FCC's own files.

As of November 2, 2010, the following information was available on the FCC ULS database and contained in the FCC's report on regional plans.

**700-MHz narrowband licenses processed and pending:**

- Conventional licenses (SG): 127 issued
- Trunked licenses (SY): 282 issued
- In process
  - Conventional (SG): 382 pending
  - Trunked (SY): 860 pending
- Total number of licenses: 1,651
  - Does *NOT* include applications pending at RPCs awaiting frequency coordination

**FCC reports the following status for regional plans:**

- Regions with FCC approved plans: 33
- Regions with FCC approval pending: 4
- Regions with no plans in progress: 18
- Total RPCs 55

Considering that these narrowband channels have been available for slightly more than a year, it is obvious to me that there is a pent-up demand for these channels. I know that in California, all of the 700-MHz narrowband channels have either been licensed or are in the frequency coordination process for local, state, and regional jurisdictions.

5. What is the current and anticipated use of 700 MHz narrowband networks?

As can be seen from the above information gathered from the FCC ULS database and from further investigation, there are 1,651 licenses issued or pending for the use of this spectrum. Many of these systems are being designed as statewide interoperability systems in conjunction with many regional and local jurisdictions. The result will be better voice communications access across all public safety agencies in a given state as well as across the nation. Further, since some of the channels are available for nationwide calling and other forms of interoperability, the result over time will be that most public safety jurisdictions will be able to access these channels. This in turn will enable better incident command and control, and dynamically cut down on the current issues of interoperability due to all of the different portions of the spectrum in use today.

Also because of the FCC's pending narrowbanding regulations that go into full effect on January 1, 2013, many public safety agencies have indicated they are considering a move to the 700-MHz narrowband channels rather than replacing their existing VHF or UHF fleets.

6. How extensively are 700 MHz public safety narrowband channels—including channels licensed directly to states, channels licensed pursuant to approved RPC plans, and channels designated for nationwide interoperability—being utilized currently for public safety narrowband operations?

The actual usage figures for the licensed systems are not available to me, however, it is important to remember that this spectrum has only been available to public safety since the analog TV sunset in June of 2009. Since that time, there has been a lot of activity in the licensing and procurement of 700-MHz channelized narrowband voice radio equipment. If you refer to the information provided as part of the answer to question 4, it should be clear that this spectrum is important to many public safety agencies around the United States and plans are moving forward for its utilization in most areas of the United States.

7. To what extent does use of the narrowband spectrum vary by geographic area?

This question is better left to those responding on behalf of the RPC community, however, it should be noted that channel designations for the 700-MHz narrowband spectrum include interoperable channels. As systems come online, they will have the ability to intercommunicate across local areas, regions, states, and across the nation.



8. *In particular, we seek quantitative metrics (e.g., number of channels in use, percentage of jurisdictional landmass covered) that will allow us to understand better the scope and scale of existing 700 MHz public safety narrowband operations.*

Once again a question better left answered by the public safety community itself. However, I have personal knowledge of systems being designed for use in rural, suburban, and city networks. In two of the counties I have knowledge about, planning has already begun to bring together many if not all of the agencies that serve the county to provide them with the interoperability they have long desired. This includes city and county fire, police, sheriff, and EMS as well as the search and rescue organizations.

State and federal agencies are also being contacted to determine whether they desire access to these systems during times of emergencies in order to be able to work with all of the local agencies on an as-needed basis.

9. *What plans exist for future deployments of 700 MHz narrowband systems, and has funding been committed for these systems?*

Again, this is not information I have access to on a nationwide basis and I can only speak for the several regional systems for which I have personal knowledge. In each case, these systems are in the planning stages, funding sources have been identified, and once the network plan is in place, these systems will file for frequency coordination via the 700-MHz RPC for their areas.

10. *In what timeframe are such systems expected to be placed into operation, and how much channel capacity are they expected to use? Again, we seek quantitative metrics (e.g., dollars committed and channel utilization / geographic coverage obtained with committed dollars).*

Again, I can only speak for the several systems for which I have personal knowledge. In each case, the timeframe for these systems includes time for planning, requests for proposals, decisions on vendors/contractors, and implementation, all of which takes a minimum of three years. Each of these systems is being developed to enable countywide coverage with service for all of the cities within the county. Each mobile and handheld device will also include the statewide channels, the national calling channels, and channels for surrounding systems.

In each case, funds will be allocated once the final system designs have been completed and the number of sites and total number of channels has been determined.

11. Are there public safety jurisdictions that are planning to deploy both 700 MHz broadband and narrowband systems in the same geographic area? If so, where?

To my knowledge, both the San Francisco Bay Area and the Los Angeles regional systems are planning to deploy both broadband and narrowband systems. In both cases, all of the 700-MHz narrowband channels have been fully allocated.

12. Will these systems be constructed independently or will they share infrastructure, network operations, or other resources?

Though I am not aware of the specifics, I can state that it has been my recommendation to many agencies that a common IP-based back-end be used for both systems and that while they operate as separate systems, that the channelized voice network and the broadband network function together to enable data and video streams to augment voice communications during dispatch and incident response.

13. What information is available as to the costs of constructing separate or combined broadband and narrowband systems?

I currently have no information about these costs to share.

14. Could flexibility benefit such jurisdictions by allowing them to shift spectrum from narrowband to broadband use over time?

As I have stated in my answers to previous questions, the intermingling of broadband and narrowband use within the same portion of the 700-MHz spectrum makes neither economic nor operational sense. Where networks are built adjacent to each other there will be interference to and from each other. Mixing broadband and narrowband will hinder, not help, the creation of both a nationwide broadband and nationwide voice interoperability system.

Further, during my research for this filing, I have learned the following about voice over LTE from various sources including 3GPP committee members:

- 1) The LTE chips that will be on the market from major chip vendors in 2011 will NOT support voice on LTE; they will support voice on 2G and 3G systems.
- 2) Chip vendors will be providing chipsets that will support One Voice (the GSMA supported voice standard for LTE) but NOT until 2013 at the earliest.
  - a. These chip vendors will provide one-to-one cellular-type voice services.
  - b. Later in the same year, the chip vendors will work on push-to-talk over LTE with group communications.

- 3) Multicast (one-to-many voice) has been available in UMTS for the past three years and there has been no demand for it from the carriers.
  - a. There is currently a pilot program in process in the UK.
  - b. Multicast can be divided by zones within a city to provide zoned dispatch as well as citywide coverage.
    - i. It will use a lot of bandwidth to do this and will materially impact the amount of data available on the same network.
    - ii. It will not work from one network to another; ONLY within the same network.
- 4) Off-network voice (simplex, tactical, etc.)
  - a. Not in release 10 of LTE; not listed as an item of interest in releases 11 and 12.
  - b. However, since Wi-Fi is moving toward off-network data services, it is possible that it might be added at some point in the future.
    - i. The earliest the 3GPP sees this as a possibility is 2015, more likely later.
  - c. In order for it to be considered as an addition to the standard, it will have to be presented to the 3GPP as a work item AND supported by a majority of the 3GPP member organizations.
  - d. Even if it is included in a later release, it will consume a lot of bandwidth. If we need multiple simplex channels at an incident, this will severely limit the amount of data that can be used over a network in the same area since it will be using the same spectrum.
  - e. Further, it will not be useable on other networks' spectrum without the other network also offering the service.
- 5) Voice over LTE will be limited to about 100 users per cell sector and each added user will again cut down on the amount of data traffic on a per-sector basis.

Based on this information, it is correct to assume that now and well into the future, LTE is not a viable option to replace narrowband voice services as required by public safety.<sup>8</sup>

15. Would the flexibility to offer broadband services in all or a portion of the 700 MHz narrowband spectrum and/or the guard band promote more efficient use of 700 MHz public safety spectrum? Are there efficiency gains that could be realized by enabling this flexibility? For example, could the use of the narrowband spectrum help satisfy needs for increased broadband capacity? Or could broadband spectrum help satisfy the needs for narrowband capacity over time? What would need to happen for this to occur?

The current state-of-the art for both broadband and channelized voice means the two networks should remain separate today and well into the future. However, it has been proven over time and using much lower speed public safety data services that having

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<sup>8</sup> Andrew Seybold: <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020550832>

data available for routine dispatch, vehicle and license checks, and automating other aspects of routine public safety communications does reduce the amount of voice traffic on a given channel.

However, in most major metro areas, voice traffic during peaks periods (Friday and Saturday nights, holidays, etc.) is already overloading many metro area voice communications systems. The addition of broadband data services should help relieve this overcrowding to some extent. On the other hand, once video and data become available, voice traffic to provide additional information over the voice network will increase in some cases.

The additional bandwidth needed for broadband is critical to the success of the nationwide public safety broadband system. For this reason, the D Block should be reallocated to public safety AND the narrowband spectrum should be left in place for narrowband voice channels and communications.

16. *If the Commission were to allow flexible use of 700 MHz narrowband spectrum and/or the guard band, would broadband operations in this spectrum potentially interfere with existing or future public safety narrowband operations? We specifically seek technical information on the likely extent of such interference scenarios. What steps could be taken to mitigate such potential harm? Would guard bands continue to be necessary to protect adjacent channel narrowband operations, and how would they be configured? What interference protection criteria or coordination requirements would be necessary to allow narrowband and broadband systems to operate in adjacent spectrum in the same geographic area, or in the same spectrum in adjacent geographic areas?*

There are many different questions within this single question. In my response, I will try to address the portions of this question for which I have documented information.

- 1) LTE, the current broadband technology that has been determined to be the standard for all broadband systems in the 700-MHz band, has bandwidth limitations as follows:
  - a. LTE can be built out in 1.4, 3, 5, 10, 15, and 20-MHz blocks. Therefore, in order for LTE to be a viable solution in the 700-MHz narrowband spectrum, the only three choices would be to sacrifice 6 MHz of the spectrum for a 3X3 MHz system leaving 9X9 for narrowband; 5X5, which would leave 7 MHz for narrowband; or 10X10, which would leave only 4 MHz for voice. Since each voice channel has both a high and low component, this would really leave only 9 MHz, 7 MHz, or 2 MHz for narrowband voice systems. It has been proven that LTE when deployed in 3X3 or 5X5 spectrum allocations does not provide the same level of spectral efficiency as it does in 10X10 and larger spectrum segments.

- b. Therefore it would not be advantageous for either broadband services or narrowband voice services to try to make use of this spectrum for both types of systems.
- 2) The interference between narrowband and LTE broadband systems would be severe. In discussing the interference issue with many of the back-end equipment vendors, they all expressed concern. The guard band placed between the broadband spectrum and the narrowband spectrum was put into place originally to minimize interference between the systems. The word “minimize” is appropriate here since there is still a potential for interference between narrowband and broadband systems. However, this interference would not be as severe as if the narrowband and broadband systems were to have to coexist in the same spectrum. In some areas, 100% of the spectrum would be used for narrowband voice services while in others it might be split between narrowband and broadband services.

With no guard band between the two types of service, interference would be severe and would degrade both systems. As mentioned earlier in this response, one of the major differences between narrowband and broadband is that broadband systems are “key down,” that is, on the air on a 24/7 basis, while narrowband systems are key down only during a transmission or series of transmissions.

Further, since narrowband radios, both base stations and mobile units, are operating at more than ten times the power of their broadband neighbors, the amount of interference between both systems will be as bad if not worse as public safety has experienced in the 850-MHz band with the Nextel iDEN system with many low-level sites, causing severe interference to handheld and mobile units operating on the same band but using higher power and talking to high-level sites.

Migrating interference between two very different types of communications technologies has already cost the public safety community a great deal both in terms of dollars and downtime, which is totally unacceptable in mission-critical communications systems.

- 3) The idea of mitigating interference using guard bands, perhaps for low-powered voice communications, would be a waste of valuable spectrum and it would be difficult if not impossible to come up with a band plan with as many variables as this plan appears to support. For example, would each broadband system have to make use of the same amount of spectrum? Would it have to be located in exactly the same portion of the band? If there is still interference between broadband and narrowband voice systems and both systems are carrying mission-critical public safety communications, how is the interference mitigated and who will pay for this?
- 4) It would appear to be problematic to those who have been involved with radio spectrum management for some time and who have already had to contend with

system degradations and other interference issues on a daily basis. Public safety communications is mission-critical in nature. It is not the same as a citizen having a dropped or blocked call, which is inconvenient to be sure. A dropped or blocked call during a public safety incident can result in the loss of life and the additional loss of property.

- 5) Trying to run both narrowband and broadband systems within the same geographic area would result in many more instances of interference than running different systems in adjacent geographic areas. However, in both cases, the results of interference could be degradation of each system, increased costs to help mitigate these interference issues, and the loss of spectral efficiency for both types of systems.

Based on the above comments as well as those that will be submitted with engineering data to further collaborate these issues, it is my contention that mixing broadband and narrowband systems in the same portion of the spectrum would result in systems disruptions on both systems—a situation that cannot be tolerated in public safety communications systems.

17. What impact would allowing flexible use of all or a portion of narrowband spectrum have on the continued ability to support nationwide narrowband interoperability? Could nationwide narrowband interoperability be maintained based on the existing distribution of designated interoperability channels in the 700 MHz narrowband channel plan, or would reconfiguration of the channel plan be necessary to add or shift interoperability channels to other portions of the band? For areas that do not construct narrowband 700 MHz systems, could narrowband interoperability occur on interoperable channels on other existing public safety spectrum bands in these areas?

The advantage of having both broadband and narrowband voice services in close but separate portions of the spectrum should be the most important consideration in this discussion. The object of providing long overdue broadband services for public safety in its own spectrum but using commercial standards was to help keep system costs low. It is recognized that because of the specialized nature of public safety, the per unit and systems costs will be higher than commercial deployments but lower than existing public safety communications systems.

The object has always been to reduce the cost to public safety to build and manage its systems. The way interoperable communications is achieved today in many areas of the nation is to equip emergency vehicles with two or more radios. In many cases, the cost of the communications equipment installed in public safety vehicles is \$10,000 or more per vehicle. If the 700-MHz narrowband spectrum is compromised and interoperability is not available to all agencies on the 700-MHz narrowband channels, then the FCC has once again failed to help solve the voice and data interoperable problems faced today

by public safety. If this plan is implemented, it will only serve to increase the cost to public safety agencies across the United States.

The best solution available is to keep the broadband and narrowband segments of the spectrum in place. The FCC's frequency plan for 700-MHz narrowband channels is already in place and is being implemented across the United States with many agencies planning to move to the 700-MHz narrowband channels. The FCC and/or Congress should reallocate the D Block for public safety broadband. This use of spectrum is the best investment the federal government can make toward ensuring that the public safety community has the spectrum and the resources it needs going forward. This is the first time in the history of public safety communications that we are close to having both a nationwide interoperable broadband network and nationwide interoperable voice network in place to serve the public safety community.

18. How much, if any, of the narrowband allocation and guard band should be made available for broadband operations? Should some portion of this spectrum (e.g., the upper portion of the band furthest from the existing public safety broadband spectrum) continue to be reserved exclusively for narrowband operations?

Please see my comments for question 17 and others. I do not believe that ANY of the narrowband spectrum should be released for broadband services.

19. If flexibility in the narrowband spectrum were allowed, what role should the 700 MHz RPCs and the states play in its implementation? What would be the appropriate jurisdictional level for deciding whether to implement flexibility? Should such decisions be made at the state or regional level? How would decisions to implement flexibility impact the role of RPCs and existing regional plans for the 700 MHz narrowband spectrum? Should state licensees be required to make any filings? Should states/RPCs be required to coordinate with one another regarding proposals for flexible use of the narrowband spectrum within their respective jurisdictions?

Flexible use of the spectrum should not be considered at all. The role of the volunteer RPCs is already difficult enough. If the FCC moves forward with the plan to share the narrowband spectrum with broadband services, the work for the RPCs will increase and the entire licensing process will be slowed even further. The RPCs would have to deal with additional interference issues, disputes over who can and who cannot use broadband in place of narrowband and where. For example, if a county or region decides to make use of the entire spectrum for narrowband communications and one of the cities within that regional area opts for broadband services, how will the RPCs deal with the situation?



No matter how this spectrum is shared, the workload for the RPCs who already basically volunteer their time will increase, and the issue of who has the right to use the spectrum for broadband and who does not could affect the entire licensing process and create gridlock for those trying to obtain the new voice channels they desperately need.

20. What would be the impact of allowing flexibility on the development of broadband, narrowband, and dual-use equipment in the 700 MHz public safety spectrum? Would allowing flexible use prior to widespread deployment in the public safety broadband allocation create incentives for the development of broadband devices and equipment capable of operating in the narrowband spectrum as well? Are there other steps the Commission could take to promote the development of such equipment? What is the potential for development of dual-use equipment that could support both narrowband and broadband use? Would such equipment be software-defined and programmable to allow for ease of transition between broadband and narrowband use? For broadband devices built to operate in the 700 MHz public safety broadband spectrum, will there be interoperability issues if these devices operate in regions that opt to deploy broadband in narrowband spectrum as well? If so, how should these issues be addressed? Conversely, if mobiles designed to transmit and receive broadband in the narrowband spectrum are used in regions that opt to deploy narrowband, will there be interference concerns between these devices and the narrowband network? If so, how should these issues be addressed?

First of all, if the narrowband and broadband spectrum remains as it is today (with the addition of the D Block) we will see multi-use devices within a short period of time. The first of these devices will use two chipsets, one for broadband LTE with backward compatibility to 3G services and another chipset for 700-MHz narrowband communications services.

Over time and with demand, and once software-defined radios have been proven in the field, I expect to see dual-mode devices capable of both broadband and narrowband services. However, as you are aware, narrowband devices must support P25 technologies as well as conventional, trunked, and simplex capabilities while broadband LTE systems will need to support 3G capabilities for the next two to four years.

The ultimate device for public safety will be a single handheld device capable of simultaneous voice and data services. With the present band plans in place, I would expect to see these devices in the market in the 2015 timeframe.

21. If the Commission were to permit flexible use of the narrowband spectrum, what if any impact should this have on the existing rules that require 700 MHz narrowband systems to narrowband to 6.25 kHz bandwidth channels by December 31, 2016? Should the Commission reconsider this requirement?



Having experienced the move from 25 KHz to 12.5 KHz narrowbanding in the VHF and UHF bands firsthand, and seeing the 20-30% degradation in coverage due to moving to 12.5 KHz channel spacing, I am not an advocate of moving to 6.25-KHz channel spacing.

The required move to 6.25-KHz spacing, as I understand it, could be accomplished using TDMA or a similar technology to provide two voice channels within a 12.5-KHz channel, thus meeting the 6.25 requirement through channel equivalency or 6.25e. The first way to do this is to slice the 12.5-KHz channel into time slots and the second is to create two separate voice carriers, one next to the other. It appears to me as though both methods would meet the requirement and it is very possible that different vendors will opt for different solutions, completely defeating the interoperability aspects of the 700-MHz narrowband voice channels.

Either method would create additional problems in terms of coverage per system. My calculations indicate that this would decrease system coverage an additional 30% over the 12.5-KHz systems that are already degraded by 20-30% from the existing 25-KHz systems in use today.

Neither of these options is very attractive and the reality is that if the narrowband spectrum is allowed to remain available for narrowband operations only, there are enough channels using the 12.5-KHz channel bandwidth to accommodate public safety. Therefore, I have to come down on the side of those within the FCC who do not favor the move to 6.25-KHz channel spacing.

22. *Would public safety resources be better spent transitioning 700 MHz narrowband operations onto a broadband platform?*

For all of the reasons I have stated in my previous answers to the questions posed, my answer is no.

- 1) Neither LTE nor any broadband technologies today and into the foreseeable future are capable of providing voice communications that meet the requirements of public safety. The greatest single failing of broadband services is the inability to support off-network, one-to-many voice communications services.
- 2) Having both a nationwide narrowband and nationwide broadband network available to the public safety community will provide for true interoperability for both voice and data services for the first time in the history of public safety communications.
- 3) Public Safety cannot meet its voice requirements using broadband services. Therefore both networks, independent of each other for the airlink but tied together on the back end to integrate voice and data services is the most intelligent way to provide the services needed by the public safety community going forward.

## Conclusions

The FCC's questions regarding the use of narrowband spectrum for broadband services are, perhaps, the right questions to ask. If broadband services were capable of providing the various types of voice communications required by public safety now or in the future, the issue would not be as cut-and-dried. However, the bottom line is that broadband systems as they are today and as they will be many years into the future will not be able to meet public safety's requirements for voice communications. Further, reducing the number of narrowband voice channels allocated on a nationwide basis does not make operational or economic sense.

Day-to-day operations require multiple voice communications channels—some on the network and some off the network. During major emergencies, the number of voice channels that will be required is not known until well into the incident. As the incident grows in intensity, the number of off-network channels also grows. First responders count on a solid, mission-critical voice communications system, trusting their own lives to the knowledge that the system will work each and every time. It is our responsibility as citizens and as the federal government to provide public safety with all of the resources it needs. Solid communications, both voice and data, are essential to their mission to serve and protect. Anything less is not acceptable.

I call on the FCC to abandon its research into co-sharing the existing narrowband channels with broadband and to recommend to Congress that the D Block be reallocated to public safety for broadband use. The FCC and Congress have a unique opportunity to provide public safety with the spectrum it needs for truly nationwide interoperable voice and broadband services. Failure to provide this spectrum for both types of services will undoubtedly result in additional loss of life and property. Some will lose their lives because we have not given them the proper communications resources to serve us to keep us safe while some will be citizens who could not get the emergency services they needed when they needed them.

Respectfully submitted,



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